ITS Field Operational Test Summary

Travel Demand Management/Emissions Detection (TDM/ED)

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Introduction

The Travel Demand Management/Emissions Detection ITS Field Operational Test, conducted in Ada County (Boise), Idaho, evaluated two ITS technologies: license plate recognition (LPR) and remote sensing devices (RSDs). The test employed these two technologies in three applications that made up the three phases of the test:

- Phase I: Conduct Origin/Destination (O/D) studies
- Phase II: Monitor emission levels of vehicles in the field and compare the emission levels of regularly tested autos (registered in Ada County) to those not tested
- Phase III: Measure emission levels of vehicles in the field to determine the feasibility of supplementing or replacing the Ada County idle emissions testing program.

Data collection for Phases I and II took place in April 1995 and for Phase III in May 1995. Analysis of the data continued until January 1996.

Project Description

The test goal was to evaluate the practicality, effectiveness, and cost of using new technologies to conduct Origin/Destination studies and to monitor vehicle emissions in the field. Test personnel used the infrared RSD to analyze the carbon monoxide (CO) content of a vehicle's exhaust and used the LPR to obtain information to associate the emissions reading of the vehicle to its owner. Figure 1 shows the system components and configuration.

Phase I of the test determined whether the two technologies could be used to conduct Origin/Destination studies in a simpler and less costly manner. Test personnel used the information collected to prepare and immediately mail O/D surveys to all identified vehicle owners. Test personnel then evaluated the number and quality of the returned surveys.

The aim of Phase II was to determine the relative contribution to CO pollution produced by vehicles registered outside Ada County (and not regularly tested for emissions) compared to the contribution of regularly tested vehicles from the county. Test personnel identified those out-of-county vehicles emitting an unacceptably high level of emissions. The test then evaluated the effectiveness of different incentives to promote voluntary adjustment of high emitting vehicles.

Phase III determined whether RSD technology could provide reliable CO emissions data. Test personnel evaluated whether the technology could enhance the existing idle emissions testing program while reducing program costs. Test personnel compared the results of the idle emissions tests of vehicles registered in ADA County to the emissions readings taken by RSD to assess the accuracy of the RSD measurements. They evaluated whether RSD testing could replace or supplement the idle emissions testing program.

In each phase, test personnel evaluated the performance of the two technologies, the impacts of

the use of each technology on the transportation system, and the benefits to air quality. In addition, they evaluated the institutional and legal issues, users' acceptance of such a system, and the costs.

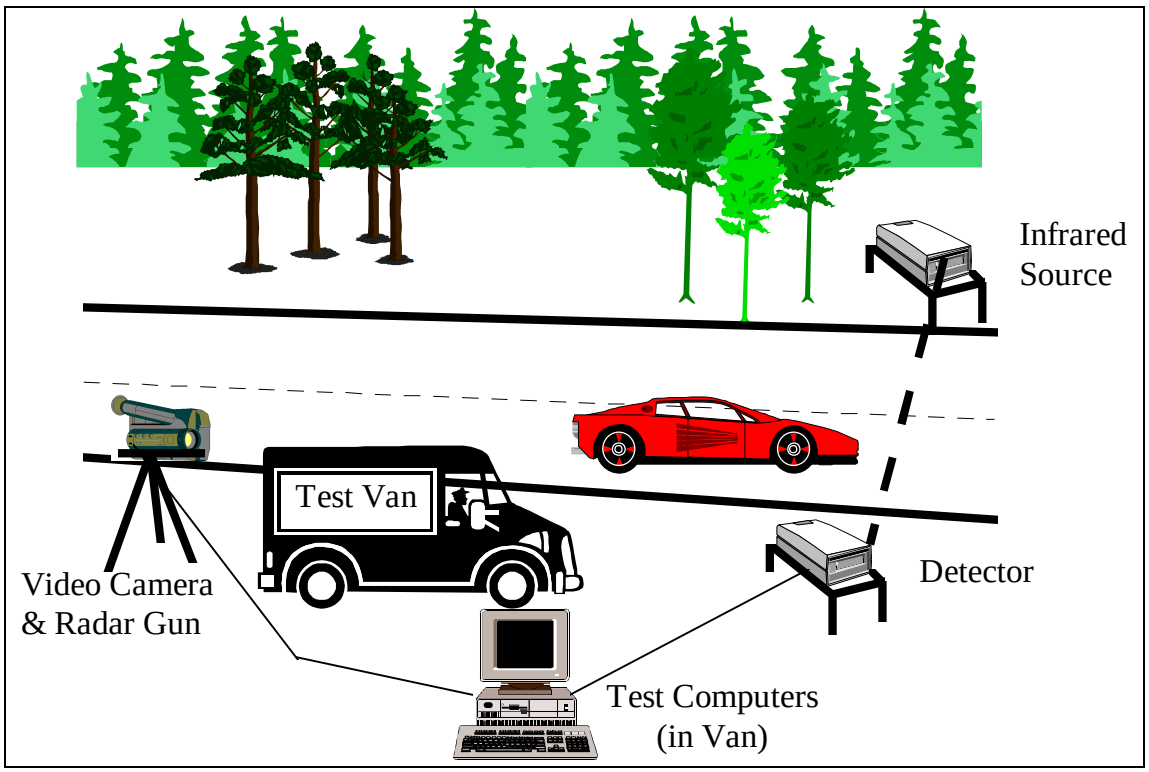

Figure 1: System Components and Configuration

Results

Overall, the RSD system performed well and transportation impacts were minimal.

The results of Phase I, Origin and Destination Surveys, demonstrated that LPR technology facilitated conducting an O/D survey in which motorists did not have to stop. The resulting automation of the travel survey process led to quick survey turnaround and high quality responses. The test methodology minimized hazardous driving incidents, eliminated disruption of traffic flow, and reduced the inconvenience to the motorists. Although the cost effectiveness of LPR technology was not conclusive, the hidden costs to the motorists and the field technicians (for example, convenience and safety) would justify its use for future O/D surveys. The test achieved a 37 percent return rate on the mailed surveys. Although the cost per returned survey using the LPR method ($8.86) was greater than in other similar tests, the cost per survey site ($5,120) was less than similar costs for other survey methods.

The test results of Phase II, Emissions Monitoring at Field Stations, showed that RSD technology can quickly and accurately measure a moving vehicle's emissions. The information collected during the test demonstrated that Ada County registered vehicles (tested annually) had a significantly lower average emissions level (10 percent to 15 percent) than non-tested vehicles. RSD technology provided a valuable opportunity to enhance existing air quality programs. RSD technology was capable of capturing license plate and emissions data to determine whether non-

tested vehicles produced more emissions than tested vehicles. This information will support the consideration of enhancements to existing air quality programs.

A careful analysis of the test results from Phase III, Emissions Monitoring of All Vehicles in Ada County, showed that the data collected was insufficient to support a definite conclusion on the use of the technology as a replacement to the idle emissions testing. The test results did not support a strong relationship between a single RSD measurement and an idle emissions test reading. Although no strong relationship exisited between these data, the RSD technology accurately observed and recorded data. Over 85 percent of the license plates were readable by LPR equipment with minimal staff assistance. (In Phase I, this figure was 76 percent.) The emissions sensing equipment recorded over 92 percent of valid carbon monoxide (CO) readings and 80 percent of valid CO and acceleration readings.

There is evidence, however, that RSD screening of a vehicle fleet, using an average of multiple readings, could provide for the identification of vehicles having a high probability of passing an idle emissions test. This group may constitute 90 percent or more of all vehicles in Ada County. Test personnel felt that cutpoints to identify "clean" vehicles and exclude them from testing with an acceptable level of confidence could be developed.

Test personnel cited several potential uses for the technology. The capability of LPR equipment to identify "out-of-area" vehicles (not subject to emissions testing) would make it possible to include them in an emissions testing program. The ability to identify "high emitting" vehicles would allow earlier detection and emissions testing of those vehicles. The exemption of "clean" vehicles from an emissions testing program would eliminate the inconvenience and cost to a significant number of vehicle owners.

In addition, the test results for all phases showed a favorable rating from the public to the use of LPR/RSD technology. The majority of telephone survey participants and policy makers did not consider it to be an invasion of privacy to take a video of the license plate, identify a vehicle owner's name and address in the motor vehicle records, and mail the owner a travel survey. A majority also did not consider RSD technology to be an invasion of privacy. Over 86 percent of telephone survey participants preferred the LPR method of conducting O/D surveys to the stop-and-ask method. Approximately 72 percent of the telephone survey participants preferred to have their vehicle's emissions tested using the RSD method rather than the idle emissions test station method.

Legacy

All system components are currently available commercial products. The project discontinued operation after completion of the test. Future application plans for this type of technology are unknown.

Test Partners

Idaho Department of Transportation

Ada Planning Association

Ada Air Quality Board

Federal Highway Administration

References

Ada Planning Association, Individual Evaluation Test Plan Report #1, Origin and Destination Survey and Emissions Monitoring at External Stations, Final Report, April 1996

Ada Planning Association, Individual Evaluation Test Plan Report #2, Emissions Monitoring of All Vehicles in Ada County, Final Report, April 1996